

Studies for Alternative Crops for Drug- Growing Areas in Asia  
(Pakistan, Afghanistan, Nepal, Thailand)

A four- month research project funded by the ODA  
Miscellaneous fund.

**Project Outline**

The project is aimed at the international illegal drug scene. It is realised that international strategies are needed to combat the global mesh of illegal drug production operations involved in the chain from cultivation, manufacture, transportation and marketing to consumption by addicts. For an initial approach the project aims to identify some high-value substitute crops as potential alternative crops for drug-growing areas in Asia.

The world's major drug- growing areas are in poverty belts. These are often in remote areas affected not only by poverty but also by lack of law and effective government. Farmers find that their soils yield a higher income from drug- crops than from any other crops. Furthermore, there are no good transportation systems, there are no small- scale agriculture- based industries and farmers have no knowledge of potential markets for their produce. Over the last 20 years a number of programmes were initiated by the UK, EC, UNDP and USA to find new crops for illegal drug- growing areas. However, success has been very limited because of price instabilities of agricultural products, transport problems and lack of local government support. Farmers have had to revert to relying on drug crops for a secure source of income. The establishment of meaningful sustainable approaches is urgently needed and high- value alternative crops are a definite option in this.

The present project is carried out through literature survey and by communicating with scientists involved in agriculture and rural development in Pakistan, Afghanistan, Nepal and Thailand. For example, those working for UNDP, FAO, USAID and government or private research institutions in Europe, the USA and Asian countries.

The research aims to identify some possible alternative crops and crop products on the basis of agr climatological-, sociological-, market- value and market outlet studies. The crop species will be identified from medicinal plants, fruits and nut species, spices, high- value essential oil producers, vegetable oil species and fast growing trees. The plant products will be useful for small scale industries, while posing no hazard to the local environment.

The result of the project will be a report, available in August 1991, on viable alternative crops of various commodity groups. The recommendations will include information on marketing outlets.

These findings will ultimately benefit the farmers and rural communities of drug- growing areas.

## ICUC TOWARD 2000 - THE STRATEGY

### INTRODUCTION

The International Centre for Underutilized Crops (ICUC) is an autonomous, nonprofit, scientific research and training centre. It was established in 1988 to address ways of increasing the use of underutilized crops both for food, medicinal and industrial products, and also for environmental improvement.

The Centre came into being following a recommendation of an International Symposium on New Crops for Food and Industry held in September 1987 and sponsored by the United Nations Environment Program, the International Board for Plant Genetic Resources, the International Foundation for Science, the Commonwealth Development Corporation, the EEC Technical Centre for Agricultural and Rural Cooperation, British Council, Gesellschaft für Technische Zusammenarbeit (Germany), the University of Southampton, and eight companies and two trusts/foundations. Originally housed by the University of Southampton, the Centre moved to King's College, London in 1990, where it is headquartered. A Management Committee met in December 1987 and guided the work of the Centre until a Board of Trustees was established in 1990 and the negotiation of a trust deed with the UK Charity Commissioner to establish ICUC as a not-for-profit international centre was completed.

### MANDATE AND OBJECTIVES

The mandate of ICUC is to foster research, training and dissemination of information in order to enhance the use of underutilized crops. The Centre defines underutilized crops as those crops of local importance which have clear potential for enhanced production and wider use.

The specific objectives are:

- 1) To establish, strengthen and coordinate an international network of scientists and programmes dedicated to the development of underutilized crops;

- 2) To evaluate and keep under review underutilized crop species as sources of both traditional and new products;
- 3) To carry out research and development in partnership with appropriate national, regional or international public organizations and with private organizations where the benefits have direct relevance to development;
- 4) To be an information centre to provide free information on underutilized crops and products;
- 5) To identify training needs, which further the mandate of the Centre, especially for scientists of developing countries, and to undertake, foster and support such training;
- 6) To develop an advisory relationship with the public and commercial sectors in matters relating to underutilized crops.

#### **INTERPRETATION OF MANDATE**

The Board interprets the mandate and objectives of ICUC broadly to establish a network of research on underutilized crops, to establish priorities, to assemble information on isolated and under-funded research work, to provide information and training, and to identify targets and fill gaps in research in order to strengthen the international network, mainly but not exclusively through collaboration with institutions in the developing world.

#### **MANAGEMENT AND GOVERNANCE**

The Centre is managed by a Director appointed by a Board of Trustees, comprising not less than 6 and not more than 10 individuals elected in their individual capacities. An ex officio representative of the host institution serves on the Board, as does the President of the Tropical Agriculture Association of the United Kingdom.

#### **THE STRATEGY FOR IMPLEMENTATION**

The program of ICUC is organized through a series of interactive subprogrammes. These comprise:

- The promotion of research and development technologies: the exchange of technologies and their evaluation by national or other programmes

- Training: the provision of short-term and postgraduate degree training
- Information: the collation and dissemination of information on past and current research on underutilized crops and their uses
- Outreach: the establishment of mechanisms in the developing world for scientists to promote the development of new crops research
- Conservation: the collection and evaluation of germplasm of promising underutilized crop gene pools

### **THE PROMOTION OF RESEARCH AND DEVELOPMENT TECHNOLOGIES**

Underutilized crops have a major role to play in alternative cropping systems, crop diversification, development of value-added products and provision of products for industrial and medicinal uses. They also have a role to play in sustained use of the environment and the restoration of degraded lands.

It is not generally appreciated that man has done more to modify and abuse the environment in the past 30 years than in the the previous 10,000 years of agriculture's existence. Current surplus production of food by the developed world and the need to manage the environment better mean that better use needs to be made of an increasingly versatile array of crop species rather than continuing to rely on a limited number of staple food crops and a limited number of industrial crops. Whereas the germplasm of the latter has been well exploited, that of the former has, in general, been neglected from a research point of view. The diversity of the minor species, which have potential for further development, is hardly known nor is the germplasm adequately exploited. As a result, research is urgently needed, especially since the wild and primitive gene pools are widely threatened with irreplaceable loss.

This entire area poses major organizational problems, since the ongoing research on underutilized species is scattered, under-funded, and uncoordinated. The strategy of ICUC is to establish priorities among species and to encourage research on those with highest priority. To guide the planning, the Centre has established a number of international committees of scientists to identify the species with known potential for further exploitation (see examples below). In this work they are guided by policy decisions of the Board of ICUC that species to be focused on by ICUC should not include any already

worked on by International Agricultural Research Centres, that attention should be paid to species of wide applicability over whole regions or ecoclimatic zones, and that promotion of technical assistance to developing countries should be a major feature of the research and development.

Suggested crop types include:

- Cereals and pseudocereals
- Fruits and nuts
- Oilseeds and fibres and industrial crops
- Roots and tubers
- Spices, medicinals and bioactive species
- Forage, fodder and floral and agroforestry species
- Pulses and vegetables
- Species for land reclamation
- Fuel species

The research agenda includes:

- fostering the collection of germplasm and the subsequent evaluation and screening of diversity and conducting basic studies on the variation patterns in gene pools, including appropriate experimental work to understand variation;
- breeding to enhance primitive germplasm for higher, more uniform yields or for enhanced contents of specific products (e.g., vegetable oils, especially linoleic, gamma linoleic, and oleic acids), and/or analytical methods;
- developing techniques to overcome constraints, e.g., methods of wide crossing for specific crop species or the development of new agronomic practices.

The research is carried out primarily in collaboration with national scientists of developing countries, but in some cases in partnership with institutions in developed countries, on the understanding that technology generation will lead to rapid technology transfer. In some cases the research is carried out by staff of ICUC itself at its headquarters. Additional collaborative research might be geared to development of alternative crops for more

developed parts of the world. The Board of ICUC closely monitors the work programme to ensure that technology generation is on a not-for-profit basis.

The range of research and technology embraces many disciplines: agriculture, processing, agroforestry, and others. The Board of ICUC sees the role of the Centre as being interdisciplinary and charged with filling strategic research gaps in collaboration with partners worldwide.

### TRAINING

The Centre has successfully organized a number of specialist short training courses, especially in adaptive research. The Board has agreed to the initiation in 1991 of a specialist one year postgraduate course leading to the degree of M.Sc. in Genome Manipulation in Crops. The syllabus for this course has been devised in full recognition of the need to provide training in the rapid improvement of underutilized plant species through a thorough grounding in genetic diversity, molecular, cytological and chromosome manipulation, and hence appropriate mechanisms for germplasm enhancement.

Most underutilized crops are based on a relatively narrow genetic base, the cultivars used are generally primitive, and despite association with man for generations, many are hardly removed genetically from the wild. The need for appropriate training is apparent, and the course is being established to address the specific needs of scientists using underutilized crops and to be complementary to other training activities.

The training programme is organized for scientists from developing countries. However, scientists from developed countries may participate if there is no call on the development assistance funding mobilized by ICUC.

### INFORMATION

Much of the information relevant to underutilized species is scattered, a great deal is in the so-called "grey literature" (internal reports of institutes and mimeographed papers), and research failures are rarely reported. One of the prime tasks of ICUC is to gather this information, collate it in a database, and ultimately disseminate it. Hence, ICUC provides an international focus as an

information centre which can conduct searches, answer specific queries, and be used to guide research and development.

To facilitate this task, the Board has agreed that Centre management should establish an "invisible college" of interested scientists worldwide as Friends of New Crops. Such a mechanism provides a two-way flow of information.

One noteworthy attribute of the information program is the collation of data on market development, thereby providing a valuable source to the commercial sector. This is an essential thrust in order to see that the research network of ICUC influences end users such as industry.

ICUC issues a quarterly newsletter with a very wide distribution. Further, the Board of ICUC has agreed that the Centre should provide the editorial office for a new international Journal of Underutilized Crops, which is expected to commence publication in 1992. A further policy decision has been taken for the Centre to oversee the production of a series of monographs on groups of underutilized crops.

## **OUTREACH**

While ICUC is in the formative stages the Board has consciously not tried to develop a complex organizational structure. However, since the Centre is essentially a networking operation with headquarters playing a coordinating and catalytic role, it is essential that an outreach programme should be developed step by step in order to serve interests worldwide. To this end there is approval in principle for the establishment of regional offices, which will work closely with scientists in particular areas.

The first regional office is being established for Asia and the Pacific at the Agricultural University of Malaysia, and another for North America at the International Fund for Agricultural Research is in the planning stages.

The initial strategy is to establish chapters of Friends of New Crops in particular countries until such time as national infrastructures and regional organizations are feasible. Pilot chapters are under formation in Nigeria, Ghana and Cameroon, and in Poland, India and Malaysia.

As stated above, ICUC works in a collaborative mode, and part of its strategy has been to establish strong links with a number of international scientific and technical programmes. These include:

- Food and Agriculture Organization of the UN (Plant Production and Protection Division)
- International Board for Plant Genetic Resources
- Commonwealth Science Council
- International Council for Development of Underutilized Crops
- International Program for Tropical Tree Crops Conservation and Development
- Economic and Conservation Section, Royal Botanic Gardens, Kew
- World Wide Fund for Nature
- International Union for Conservation of Nature and Natural Resources



# NEWSLETTER

Promoting Plant Species for Food ,Industry, Energy and Sustainable Environment

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Hello again and welcome to the expected ICUC Newsletter. We apologise for the long absence of the Newsletter which was due to the Centre's move to King's College and restructuring of the Management Committee (News Section).

Along with the move, the Centre has applied for charitable status in the U.K. This will ensure tax relief and fund raising advantages whilst in no way affecting our international status.

Progress has been made on several fronts. The Centre has now agreed with a publisher to produce a series of monographs on underutilized crops showing potential for development. A survey is being carried out on the demand for a 'Journal on Underutilized Crops'. We hope you will support and cooperate with our ventures.

The Centre has started to operate under three Sections:

1. Crop Improvement (Genetic, agronomic and processing)
  2. Database/Information Advisory Services
  3. Training
- to which soon will be added a fourth: Forestry/Environment/Energy.

Each is concerned with temperate, arid and semi-arid and tropical crops.

Several projects have started in the U.K. and in overseas countries to determine the

priority crop species for crop diversification and improvement. Funding is being sought from various sponsors to identify non-timber plant species for sustainable agriculture. These plant species need to be developed and conserved because of their importance to nature and their possible utilization.

National committees have been established in Poland, Nigeria and in Malaysia. Regional coordinating committees in Asia/Pacific, West Africa and North America are being discussed. The Centre will extend its activities in the Caribbean and Pacific areas in the near future. The Centre has now acquired a computer for its database and information services and this has filled a long-standing gap. We are using the D-base III program as most countries have this program. This will enable us to disseminate information by means of floppy discs. Agreement has been reached with Chapman & Hall to publish two books (Cereals and Pseudo-Cereals; and Pulses and Vegetable Crops) in the Monograph series. Two more books of the series are being negotiated with the publisher.

On the training front the Centre is continuing its 3-month course on "Applied and Adaptive Research for Tropical Crop Production". Last June the Centre organised a short course on "In Vitro and Molecular Techniques for Crop Improvement" in association with the University Pertanian, Malaysia. A new

one-year course "Genome Manipulation in Plant Breeding" will start in October 1991 at King's College London and lead to a University of London MSc degree. These courses provide a base for the Centre's educational activities.

The Centre participated in several international meetings this year and Dr. Nazmul Haq presented papers as an invited speaker in many of them. Most notable papers were on: "Crops for the Future", "New Crops Opportunities" and "Strategies for the Enhancement of Underutilized Crops". Dr. Haq has also visited FAO, IBPGR, the Venezuelan Embassy in London, National Arboretum, Washington and the International Jute Organisation (IJO) to discuss possible collaboration in activities of the Centre. FAO has agreed in principle to a joint training programme. Discussion is also in progress with the IJO for collaborative projects on the utilization of wild species for the improvement of fibre crop species.

Recently, meetings were held in the U.K. to discuss possible collaboration with the NORLEG group at AFRC Food Research Institute in Norwich (see page 10), the AFRC Arable Crop Research Centre at

Rothamsted and Wye College of the University of London.

Last year the Centre received 49 visitors at its Head Office. Half of our visitors were from overseas countries (Africa, Asia, Middle East, Latin and North America).

The Centre had a stand to display its work and publications at the Royal Agricultural Show, 1990 at Stoneleigh and we were most encouraged by visitors' comments. The Stand was provided by the Tropical Agricultural Association, U.K. (TAA).

The Centre organised an OPEN DAY for its field experiments and demonstration plots at Coggeshall, Essex. This was organised jointly with J.K. King & Sons Ltd. There were 49 visitors from the U.K., Holland and USA and they came from Universities, Research Institutes and Industry. It was a beautiful sunny day, perfect for the OPEN DAY and visitors enjoyed the day. We were delighted to be able to show them our trial plots for European crops.

N. Haq  
Director, ICUC

## NEWS

Since our last Newsletter, ICUC has moved from Southampton University to King's College London (University of London). Our new base provides us with a more central location, near to the various development organisations based in the capital and conveniently situated for overseas visitors. However, we shall continue to maintain close links with Southampton, where faculty and staff have been most helpful to us over the last two years, and we are very pleased that Dr. Haq has been appointed a Visiting Fellow at the University.

Concurrent with our move, the Management Committee has become a Board of Trustees and we are applying for registration in the United Kingdom as a charitable institution. Charitable status confers

certain tax advantages and is particularly helpful in fund raising in the U.K., where charitable trust funds usually make it a condition of their support. Registration will in no way affect our international status or activities.

Although funding is still a constraint, ICUC has made significant progress during the last year.

We continue to receive invaluable support from the Overseas Development Administration (ODA) and the British Council. ODA has awarded us a research contract on "The Development of Techniques for Wide Crossing in Legumes", beginning April 1990 and initially for two years. The British Council recognise

our three-month Adaptive Research course for support. Participants at the last course were also supported by the Swedish Agency for Research Cooperation in Developing Countries (SAREC) and the Swiss Pakistan Potato Project. Plans are advanced for a one-year course in "Genome Manipulation in Applied Plant Breeding" to be given by the Centre at King's, beginning October 1991 and leading to the award of a University of London MSc.

The ICUC Network presently consists of 366 correspondents in 60 countries. In Malaysia, ICUC organised a joint two-week course with the University Pertanian Malaysia on "In vitro and Molecular Techniques for Crop Improvement" in June 1990, supported by the British Council, and this provided an opportunity for Dr. Haq to open discussions with the Malaysian Plant Genetic Resources Committee on setting up a National Steering Committee for Underutilized Crops. Also with British Council support, Dr. Haq visited Poland in July to discuss collaboration in the development of new crops. A National Committee for New Crops is being established and a Conference on New Crops for Poland is to be held in February 1991 under the auspices of the Polish Academy Link Programme.

The growing interest in underutilized crop plants, and the great number of candidate species worldwide, underscore the need to establish the degree of priority individual species should be given for Research and Development, by commodity and region. To this end we are in the process of establishing seven Commodity Group Committees to advise on the priority that should be given to work on a regional basis. The Fruit, Nuts and Tree species committee has already made substantial progress. It is chaired by one of our Board members, Professor Trevor Williams, formerly Director of the International Board for Plant Genetic Resources (IBPGR) and now head of the Neglected Tree Crop Germplasm Programme of the International Fund for Agricultural Research (IFAR). Professor Williams has also agreed to head the Editorial Board of a series of monographs, covering groups of underutilized crops, that ICUC will publish.

The Board feels that, whilst progress to

date has been more modest than we would wish, it has been demonstrated that ICUC is a viable institution and is here to stay.

K.R.M. Anthony  
Chairman, ICUC

## New Staff

Amy Bradshaw joined the Centre in September 1990 to work on an ODA-funded project on "Development of Techniques for Wild Crosses in Legumes". The project is linked with ICRISAT and involves the use of wild species of *Cajanus* to improve the cultivated Pigeonpea.

Mr. F. R. Diaz from Mexico joined the Centre in October 1990 as a visiting scientist to work on the development of drought and disease resistance in *Phaseolus*, again using its related wild species. He is funded by IAEA (International Atomic Energy Authority).

The Centre is also expecting Dr. Corcuera of Peru in December for a six months stay to work on the genetics of *Amaranth* spp. Dr. Corcuera is funded by the European Commission.

Two Scientists, one from Nigeria and the other from Ghana, are also expected in Spring 1991 and will spend their sabbatical leave with the Centre. They will help the Centre to strengthen its database on underutilized crops.

## Regional News

### Europe

Several trial plots were established by ICUC of temperate and sub-tropic crop species. These included: Lupins, Buckwheat, Amaranths, Adzukibean, Cuphea, Meadowfoam, Safflower, Kenaf, Crambe, *Phaseolus* and *Oca*. These trials were visited by many scientists in the Centre's open day at Coggeshall this year. Information is being assembled from industries and farmers to determine their need for their diversification programmes. This will enable the Centre to select priority crops as the Centre intends to put thrust on these species for their development. In this respect,

the Centre will soon contact the Farmers Union for their help.

The Centre hopes to carry out trials in three sites in the U.K. (Essex, Kent and in the West Midlands) in 1991. The Centre has established its collaborative links in Denmark and Poland and is discussing possible links with other European countries. The Centre intends to establish a European Coordinating Committee for New Crops in the near future.

Poland - A national committee in Poland was established in August 1990 and has the following members.

#### National Committee for the Development of New Crops for Polish Agriculture

Prof. E. Nalborezyk - Chairman  
Prof. H. Czembor - Deputy Chairman  
Dr. J. Rybozynski - Secretary

#### Members

Prof. Z. Hryniewicz, Dr. G. Fordorisk,  
Dr. K. Pilszka, Dr. F. Tumiowiec,  
Prof. M. Ruszkowski, Prof. S. Goral,  
Dr. W. Swiecicki, Prof. A. Legocki,  
Prof. F. Wiatroszak.

A Workshop on New Crops for Polish Agriculture will be held from 11 - 16 February (see News)

#### Africa

The International Centre for Underutilized Crops has helped to establish a National Steering Committee for the Plant Diversity Research Organisation (PDRO) in Nigeria. This Steering Committee was formed at the end of a 3-day Symposium on Conserving Biodiversity held at IITA, Ibadan from 2-5 September. The primary objectives of PDRO are; to create public awareness of biological diversity; to establish a priority list of underutilized crops, and to develop strategic research for the development of priority crop species; to identify gaps in existing national biodiversity programmes; and to disseminate information on underutilized crops. Scientists from Nigeria, Ghana and Cameroon were present and a list of priority crops for development was

prepared (see below). Similar meetings are planned for Ghana and Cameroon and hopefully a Coordinating Committee for West Africa will be established.

#### National Steering Committee for the Plant Diversity Research Organisation

Dr. J. C. Okafor - Chairman  
Prof. J.K. Egunjobe - Vice-Chairman  
Dr. F.M. Dania Ogbe - Secretary  
Dr. D. O. Ladipo - Assistant Secretary

#### Members

Prof. I. Samarawira, Mr. M.B. Sarumi,  
Dr. L. Denton, Dr. F.M.O. Agbo,  
Mr. C.E. Ago, Dr. N.Q. Nq.

#### List of Priority Crops

*Digitaria exilis*, Grain Amaranths,  
*Dioscorea* spp., *Vernonia amygdalina*,  
*Celosia* spp. *Irvingia gabonensis*,  
*Treculia africana*, *Dacryodes edulis*,  
*Citrus lanatus*, *Thaumatococcus daniellii*,  
*Calamus decratus*,  
*Cochlospermum*, *Ocimum gratissimum*,  
*Voacanga africana*, *Piper* spp., *Centrosema pubescens*, Orchids, *Tetracarpidium*, *Funtumia* spp. *Voandzeia subterranea* (syn. *Vigna subterranea*).

#### Asia

A Steering Committee for the Development of Underutilized Crops was established at the University Pertanian, Malaysia (UPM) last June. The Steering Committee will work as ICUC's chapter in Malaysia and plan and develop the programme in conjunction with the Malaysian National Committee for Plant Genetic Resources. The Faculty of Food Science and Biotechnology has already offered to be the Secretariat for the Centre's activities.

The Unit for Underutilized Crops at the National Bureau of Plant Genetic Resources in India has already expressed willingness to collaborate with the Centre and soon we will have interaction with the unit for the Centre's activities in India.

The ICUC has been in communication with several national government organisations

in Asia to plan and develop a national programme in Asia.

### CROP NOTES

#### *Grevillea robusta*

The genus *Grevillea* belongs to the family Proteaceae, which includes many genera of shrubs and small trees in temperate, subtropical and tropical regions of the Southern Hemisphere. *G. robusta* is the largest species in the genus, reaching a height of nearly 40 metres and a diameter of 1 metre.

The tree occurs naturally in the coastal areas of northern New South Wales and S. Queensland, from near sea level to a maximum altitude of 1120 m; its climatic range is wide. The tree was one of the first native plants to be brought into cultivation in Australia, but, poor performance in tree plantations means it is no longer a plant of commercial interest in its native land.

In the early 1860s, *G. robusta* seed was sent to the Royal Botanic Gardens in Ceylon (Sri Lanka) from Australia - from there it soon became widely distributed throughout Sri Lanka and India where it was originally used to provide light shade in the tea plantations. From India it found its way to Africa (pre 1900) where again it was used for shade in tea and coffee plantations. However, more recently research work has shown that shading tends to lower coffee and tea yields and *Grevillea* has fallen out of favour as a shade tree for these crops.

In Eastern and Central Africa *Grevillea* has much popularity as an agroforestry species. It is most widespread in Kenya, Tanzania, north to Ethiopia, east to Uganda, Rwanda, E. Zaire and Madagascar. Farmers in these countries plant *Grevillea* along boundaries and scattered within crop areas.

*Grevillea* is a multipurpose tree - it is this multiplicity of use which explains its popularity. The tree is easy to propagate and manage, produces good yields of poles and fuelwood, and does not compete strongly with adjacent food and cash crops. *Grevillea* poles, preservative treated, are suitable for use

as fence posts or transmission poles. Sawlogs can be harvested 15-20 years after planting with yields of branches and poles from pruning and coppicing at earlier ages. Whilst trees such as eucalyptus might produce more wood/m<sup>2</sup> they are more competitive with adjacent crops or have other disadvantages.

In E. Africa it is used as fuelwood. It is also used in the manufacture of light furniture, flooring and plywoods. *Grevillea* leaves are often used as a mulch or as bedding for livestock. They can be used as emergency fodder in times of drought but they have poor palatability.

The tree also produces a gum (when stressed or injured). *Grevillea* is a valuable source of nectar and pollen for honey production.

*G. robusta* which grows well over a wide range of climates grows best in areas with a mean annual temperature of 15-18°C, annual rainfall 1000-2000 mm without prolonged seasonal drought. It grows best on reasonably fertile, deep open soils, not tolerating waterlogging. It tolerates a wide range of soil pH. Its propagation is easy provided fresh seed is available (viability is lost quickly unless stored at a low temperature). Given optimum conditions, annual increments of 2 m in height and 2 cm in breast-height diameter have been achieved over the first 5-10 years in many countries. Although not highly susceptible to pests and diseases,

*G. robusta* tends to be short-lived (15-20 years) though frequent pollarding will restore vigour.

Farmers in Africa take advantage of its ability to grow adjacent to crops without reducing yields, planting food and cash crops right up to the trunks, cutting off the trees side roots to avoid competition.

*Grevillea's* poor performance in Australian tree plantations may be due to autoallelopathy. Water-soluble extracts from the roots of adult trees suppress and eventually kill their seedlings. This could prevent trees from growing

well when closely spaced.

Despite its wide distribution and multiplicity of use *Grevillea* has attracted little research attention. Given the wide climatic differences over the species natural range, substantial variation might be expected in such characters as growth rate, frost and drought resistance, degree of deciduousness, coppicing ability and foliar values for fodder and mulch. However, genetic studies, undertaken by CSIRO (1) have shown that seed introductions to some countries have come from only a few trees, providing a very narrow genetic base. Inbreeding is although thought to have reduced vigour and adaptability.

Identification of genetic improvement strategies, followed by widespread dissemination of superior seed through extension programmes could bring real benefits. A wider genetic base would provide increased insurance against pests and diseases (such as pustule scale *Asterolecanium pustulana* and termite attack).

A better knowledge of *G. robusta*'s breeding system will help determine methods for genetic improvement and seed production. The development of micropropagated techniques and vegetative propagation could be important in genetic improvement programmes, as could hybridisation with other *Grevillea* species.

Much research is needed in the following areas: appropriate planting densities; rotation ages; pruning and pollarding; mineral nutrition; root distribution and turnover; soil microbiology effects on autoallelopathy; time series data on growth increments; irritability to sap/sawdust.

(1) Commonwealth Scientific and Industrial Research Organisation.

Jane Monks

### *Acacia senegal*

Gum arabic has long been considered a rare and precious commodity. Its commercial value, recognised in ancient times, has not diminished with time, due in the main to the fact that a suitable substitute has never been found.

The gum is used in the manufacture of glue, sweets, pills, as a stabiliser in wine and fizzy drinks, as a fixative for paintings and ceramics, and is used locally for starching clothing, cooking and medicinal purposes.

Gum arabic is produced by the *Acacia* tree as a means of protecting it against droughts; to avoid dehydration the tree secretes the viscous liquid whenever the wind, animals or insects damage its trunk. Its main root can reach 1 metre in depth whilst its secondary roots spread through the sand protecting it from uprooting by wind. Despite its drought tolerance, *Acacia senegal* has suffered greatly in the drought years of the last quarter of the century. This is despite the fact that it needs only 250-270 mm rainfall and withstands 9-11 months of drought and temperatures of 45°C.

However, its disappearance is due more to disarray in herd movements caused by low rainfall than drought itself. Herdsmen lead their stock into the least arid areas, areas where young shoots of the gum tree are produced and provide browse for their stock. Annual production has declined:

60,000 tonnes - 1970  
20,000 tonnes - 1980  
45,000 tonnes - now

Attempts to domesticate the tree have not been successful; plantations produce highly variable yields. Until such time as the selection for high yielding strains is successful all attempts to protect the *Acacia* from climate, man, and beast influences in its natural habitat must continue.

Jane Monks

## Kenaf (*Hibiscus cannabinus*. L.)

There are about 200 species within the genus *Hibiscus*. Of these a number yield fibre, others edible fruits, and others are of decorative value. The most common species are *H. sabdarifa*, *H. esculenta* and *H. rosasinens*. *H. cannabinus* is known by many common names including bimli, bimli patun jute and decan hemp but the most common is kenaf. Although kenaf is grown in many parts of the world it grows wild in tropical/subtropical Africa and Asia.

Normally grown between 45° N and 30° S, in temperatures up to 25°C this herbaceous plant thrives in well-drained, neutral sandy loams and cannot tolerate waterlogging. There is considerable variation in habitat, colour, thickness of stem, leaf, flower colour and adaptability in both wild and cultivated forms.

Kenaf, a fibre crop, has recently generated much interest among the scientific community due to its multiplicity of use and new technology developed in the USA (mechanised harvesting and mechanical decortication).

Kenaf fibres are about 3.2 m long and are used to make similar products to those from jute. The fibres can be used for ropes, cordage and fishing

nets and can be woven to make coarse sacks, bags and canvas. More recently it has been successfully used for making newsprint and a pilot plant has already been set up in the USA. Research and development work for pulp production has also been carried out in Australia and Thailand. Despite successful and promising field and industrial studies, commercialisation was delayed due to lack of industrial interest. However, the drop in prices of other commodities, has meant its inclusion as an alternative to sugarcane.

In addition to its cultivation for fibre production, the seed of kenaf contains 20% oil, which can be used as a lubricant and for illumination. It can also be used in the manufacture of soap and paint. The leaves provide useful cattle fodder.

There are few cultivation problems; the

major problem is the lack of disease and pest resistance. (The major diseases being dry rot, leaf spot, stem rot and anthracnose, whilst the major pests are root-knot nematodes *Argulusacutus* and *Podagrica* species). As already stated, wide genetic variation exists and what is needed is a systematic collection and evaluation of germplasm.

The major problem facing the commercialisation of this crop was the need for mechanised harvesting and decortication. These have now been developed in the US. Despite overcoming this hurdle, the crop remains underutilized due to the cost of harvesting and retting. New processing technology will hopefully open the horizon for this crop.

In a world where the demand for pulp is increasing, and where forests are being cleared on a grandiose and alarming rate to meet this need, kenaf certainly has a place; its cultivation could help maintain the balance in the forest (and environment).

N. Haq

## NOTES FROM JIM DUKES, U.S.D.A.

Lack of water has traditionally been the limiting factor in the use of deserts for agricultural production. Irrigation has often been seen as the solution to the problems but with deleterious results. Over-irrigation can deplete ground water causing salination of the soil, conditions which also threaten agricultural production. Research workers at the Ben Gurion University are taking another approach, they are assessing some desert plants for use in arid land agricultural production systems.

Plant material was collected, propagated in quarantine and transferred to experimental orchards in arid southern Israel. The orchards differ in a number of factors including annual rainfall, soil and water characteristics and temperature extremes.

1. Marula (*Sclerocarya birrea* subsp. *caffra*)

This is a large deciduous tree which grows wild in north Southern Africa and parts of eastern Botswana. The flesh of its fruit is eaten fresh (being juicy and aromatic) or processed into jams, juices and alcoholic beverages. The fruit is a valuable source of vitamin C for rural communities. In experimental plots this plant has been found to suffer under temperatures of -7 °C but in the spring the plants readily rejuvenated. It is easy to propagate either by shoot or root cuttings.

2. White sapota (*Casimiroa edulis*)

This is a medium sized evergreen tree originating from Central America. Its fruit has a yellow-green skin with off-white sweet flesh - selection work in the USA has produced a number of high

yielding cultivars with improved fruits. The seeds of *Casimiroa* germinate easily and seedling transplantation proves to be no problem.

In experimental plots this plant showed some symptoms of NaCl leaf burn (in areas of low rainfall) and in hot months its growth was slowed. However in the autumn the plants recovered well. *Casimiroa* seems to be more hardy than *Sclerocarya*, surviving -7 °C with no damage.

3. Mongongo (*Ricinodendron rautaneii*)

This is a large, deciduous tree which grows wild on sandy soils between latitudes 15 and 21 degrees in South Africa. The fruit has a thin edible flesh surrounding a pleasant tasting kernel contained within a stone. The kernel has been found to be rich in fats (approximately 40%) and protein (approximately 38%). It plays a central role in the diet of the hunting people of the Kalahari Desert.

Seed germination was achieved after treatment with acid, transplantation proves no problem. In experimental plots this plant died from NaCl burn (in areas of extremely low rainfall) and as with *Casimiroa* growth slowed in the summer. Plants have been found to be intolerant

of low temperatures.

Research work with this species is still in progress with research centring on germination, transplanting, and survival of these trees. The commercial value of the fruit is being looked at with regard to fruit yield and quality. Time and research may prove these plants to be a lucrative and sustainable alternative to the expensive irrigated agriculture present practices.

Pepper (*Piper nigrans*)

Diversifying into alternative crops is important in stabilising farmers incomes. This is especially true for the small holder. In Vanuata the traditional crops are copra and cocoa, however the current market prices of these two crops are unstable and subject to rapid price changes. Alternative crops must suit smallholders and must be able to fit into the present management practices.

Researchers and extension officers believe that Pepper is a viable alternative for smallholders in Vanuata. They are collaborating to produce a management package which will suit smallholders and supply a high quality product to the export market.

Selected varieties of black pepper (*Piper nigrans*) are being grown from cuttings. The cuttings are started off in a protected pre-nursery bed before being transplanted into individual black polythene bags. The seedlings are gradually hardened off (shade and sun) and, when 8-12 inches high are ready for transplanting.

The local plots of Tagabe have used *gliricidia* (*Gliricidia maxima*) as supports for the pepper vines. After planting, full production can take 2-3 years.

- *gliricidia* must be carefully pruned to control the amount of shade (too much and the plants are more likely to be damaged by cyclones, too little and the leaves burn).
- *gliricidia* prunings are used as a



mulch around the trees and vines (prevents drying out and recycles nutrients).

vines must be pruned regularly to encourage flower production, and therefore seed production.

Seedlings are being distributed to smallholders by extension officers who, at the same time, offer technical support with advice on crop management.

Harvesting lasts from September to February, with a peak in November/December. A well managed vine produces 2 kg/year of sun-dried seed. Pepper is a highly labour-intensive crop, needing to be harvested every 10 days. Extension officers therefore advise a maximum of 20 vines for each farmer - this avoids taking labour away from other crops.

At present the farmers receive a subsidised price of US\$2.50/kg, far above the current world price of US\$1.25-1.50/kg. However, this price is helping to encourage farming of the pepper vine and to maintain the high quality of its pepper. With proper marketing, a better produce can demand a premium price from importers - all the more important when one considers the small part of total world production to which Vanuata contributes.

J. Dukas

#### New Crops for Arid Lands at the Institutes for Applied Research

The Institute for Applied Research (IAR) of the Ben-Gurion University of the Negev (previously the Negev Institute for Arid Zone Research), has been involved for more than thirty years with the introduction, acclimatization and development of crops for arid lands. Research is being carried out with practically all categories of crops - except grains.

Industrial Crops. Twenty years of research have led to the domestication of jojoba (*Simmondsia chinensis*), a xerophytic shrub from the Sonora desert.

The fruit of jojoba contains a valuable wax used in the cosmetics industry and as a lubricant. Today research is centred on *Vernonia* spp., the seeds of which contain high-quality epoxy oils.

Forest and landscaping plants. Hundreds of species from practically all continents have been introduced and screened for drought and salt tolerance. Selected species such as *Eucalyptus torquata*, *E. sargentii*, *Acacia salicina*, *A. sclerosperma*, *A. victoria* and *Melaleuca pubescens*) and are being used for large-scale afforestation and landscaping of the northern Negev desert. Other species such as *Prosopis* spp., *Conocarpus erectus*, *Suaeda vera*, *Limonium* spp. and *Sesuvium* spp. are being used for landscaping with highly saline water. Comprehensive lists and propagation material of drought- and salt-tolerant species are available on request.

Fruit trees. This is a relatively new areas of research at the Institute. Some 30 species of fruit-bearing plants are under investigation. The outstanding species are: prickly pear (*Opuntia ficus-indica*), marula (*Sclerocarya birrea*), sapodilla (*Achra sapota*) and white sapota (*Casimiroa edulis*).

Vegetables. Research is centred around vegetables of the Cucurbitaceae family such as karela (*Momordica charantia*), kiwano (*Cucumis metuliferus*) and turia (*Luffa acutangula*).

Medicinal plants. Many medicinal plants originate in arid and semi-arid environments. Senna (*Cassia acutifolia*), whose leaves and pods are widely used as a laxative, was investigated in depth and developed as an intensive mechanised crop.

Ornamentals. Xerophytes and halophytes have a great potential for the ornamental industry. Caudex (thickening of the lower stem) producing plants such as *Ficus petiolaris* from Baja California or *Adenium obeseum* from East Africa were developed into "Bonzai looking" pot plants. Branches of *Maireana sedifolia* and *Eucalyptus Kruseana* from Australia are being used for floral bouquets decoration, and *Eucalyptus torquata* x

woodwardii are being grown for flowering branches. To date, the work of the Institute for Applied Research has been directed towards the particular needs of the Negev of Israel. With the worldwide increase in demand for new crops for arid zones this work is gaining international significance. The staff of the IAR will be pleased to cooperate in any international activity related to new arid land crops. Please contact Dr. S. Mendlinger, IAR, P.O. Box 1025, Beer-Sheva 84110, Israel.

#### NORLEG - The Norwich Legume Group

NORLEG, the Norwich Legume Group, constitutes a UK centre for promoting and carrying out legume science and technology. It represents a unique association of some fifty senior scientists with international reputations in many avenues of grain legume research, including: - seed and cellular development; genetics and molecular biology; pathology and disease resistance; *Rhizobium* - legume symbiosis; compositional analysis and variation; animal and human nutrition; issues specific to resource-poor countries; utilization of fibre and storage products (starch, protein, oil); food processing technology.

NORLEG scientists are conveniently located on one scientific complex on the outskirts of Norwich and are based at the Agricultural and Food Research Council's Institute of Food Research, the John Innes Centre for Plant Science Research and the University of East Anglia and have ready access to the considerable resources of these organisations.

The aim of the Norwich Legume Group is to establish worldwide networks with individuals/organisations having an interest in legumes. Participation in NORLEG, open to private companies, academic institutions or producers, will provide:

- access to current information on legume science and technology, either through individual and confidential consultations or via regular symposia and newsletters.
- opportunities for contributing to existing and future programmes.

- opportunities for initiating projects targetted towards individual needs.
- opportunities for technology transfer including the exchange of personnel across laboratories, training etc.
- opportunities for on-site trouble shooting arrangements, especially in resource-poor regions.

As the utilization of legumes continues to gain political, economic and ecological importance, NORLEG aims to be at the forefront of exploitation of scientific opportunities. For further details please contact: NORLEG, John Innes Centre for Plant Science Research, Colney Lane, Norwich, NR4 7UH, U.K.

#### BUROTROP

The Bureau for the development of research on tropical perennial oil crops is now established in its Paris offices. Initially BUREOTROP's work is confined to two crops, coconut and oil palm, but its mandate allows expansion into other tropical, perennial oil producing species, including those which are currently under-utilised.

BUREOTROP's director, Mr. Oliver Dufour, would be pleased to hear from readers of the ICUC Newsletter on any matter relating to its mandate. BUREOTROP will be issuing the first of its own newsletters in January 1991 and is already establishing a database, and working towards the co-ordination of a network of projects throughout the world. BUREOTROP aims to establish networks of research projects and addressing priority areas of research and will work mainly through the National Agricultural Research Programme in developing countries.

BUREOTROP's Executive Committee consists of people from both consumer and producer countries, and meets several times per year under its Chairman Mr. Roger Smith of ODA, London. A programme committee meets under the chairmanship of Michel de Nuc'e de Lamothe, Director of IRHO - CIRAD in France.

BUREOTROP was established with the help of

a grant from the European Community, but it also receives grants from several other Donors, including Belgium, France and Germany.

BUROTROP is organising two seminars in Africa in 1991 - the first deals with 'Coconuts in Africa' and will be held in Arusha, Tanzania, from 3 - 7 February 1991 with the kind cooperation of the Government of Tanzania and the Tanzania National Coconut Development Project. The second will be on 'Oil Palm in Africa', and is being planned for June, 1991 in the Ivory Coast. These seminars will determine BURTROP's programmes in Africa for the coming years.

For further information on BURTROP and a copy of its brochure please contact:

BUROTROP, 17, Rue de la Tour, 75116 Paris, France.

Tel: 33 1 40 50 71 29 or

Fax: 33 1 40 50 71 30

#### Strategy for Research on Renewable Natural Resources

The Overseas Development Administration has published its strategies for renewable natural resources to meet the needs of developing countries. It covers basic and strategic research to translate basic knowledge into new technology and transfer and adapt this technology to help the end users in developing countries.

There are nine strategic areas:

(1) Resources Assessment and Farming Systems, (2) Agricultural Engineering, (3) Integrated Pest Management, (4) Food Science and Crop Utilization, (5) Plant Sciences, (6) Animal Health, (7) Forestry and Agroforestry, (8) Fisheries, and (9) Other Specialisms. Each area crop species and areas of research have been allocated relative priorities for support by ODA.

ICUC is disappointed to observe that the priorities are attached only to well exploited crop species and ODA's strategy takes little account of the potential for underutilized crops. Possible global warming and environmental changes are causing great concern to agriculturists,

as they need to select plant species to face these changes for successful cultivation in the developing countries. Many of them feel that underutilized plant species may alleviate the problems of agroclimatic changes as many species could be adapted to agricultural systems in the developing countries.

The other point to make on the strategy plan is that low priority has been given to legume crop species. In many countries, food legumes are the poor man's protein and many underutilized legumes are, at present, used in subsistence agriculture to meet this need in the developing world. There is a need to give higher priority to food legumes for further utilization so that legumes are used fully to feed the poor in these countries.

Although we congratulate ODA on its first strategy plan, we ask them to reconsider the list of priority crop species and include potential underutilized crops for sustainable cultivation. This would not only help to feed people but many species could be used for energy and to sustain the environment. ICUC would be willing to help and to provide information on potential underutilized crop species to ODA.

## ANNOUNCEMENT

We are grateful to:-

BAT which has donated £1000 for each year for three years (1989, 1990 and 1991) to the Centre's Core Funds; and to

Mr. L.E ST. LAWRENCE of Kent who has sponsored subscription for one year for Economic Botany to include in the Centre's library.

The Board of Trustees would welcome any donation (individual or corporate) in kind and/or cash to achieve the objectives of the Centre. If interested please contact Mr. Ken Anthony, Chairman, Board of Trustees (ICUC, Atkins Building, Kings College London, London W8 7AH).

## FUTURE MEETINGS

### New Crops for Polish Agriculture

A symposium on the 'Development of New Crops for Polish Agriculture' will be held in Warsaw Agricultural University from 11-16 February 1991. For further information please contact: Prof. E. Nalborczyk, Pro - Rector, Warsaw Agricultural University, Nowoursynowska 161, 02-766, Warsaw, Poland.

### Economic Plants of West Africa

A joint one-day meeting on 'Economic Plants of West Africa' will be organised on 6 July 1991 by the International Centre for Underutilized Crop and the Nigerian Field Society, UK Branch. Please contact for further information: Mr. P. Tuley, 18 Mountside, Guildford GU2 5JE, or Dr. N. Haq, ICUC, Atkins Building, King's College London, Campden Hill Road, London W8 7AH.

### New Crops for Europe

Overproduction, price instability and environmental changes are causing great concern to European farmers. Both scientists and industries are looking for diversified products and plant species. A three and a half day Symposium will be held in September 1991 to bring together scientists, industrialists and policy-makers with a view to identifying the

opportunities for developing new crops of commercial value. Please contact: International Centre for Underutilized Crops, Atkins Building, Kings College London, Campden Hill Road, London W8 7AH.

### The International Conference on the Development of New Crops in Israel

An international conference on the Development of New Crops will be held at Hyatt Regency Hotel, Jerusalem from 8-12 March, 1992. For further information please contact: Prof. Dov Pasternak, The Institute for Agriculture and Applied Biology, Ernst David Bergmann Campus, P.O.B. 1025, Beer-Sheva 84110, Israel.

## COURSES

ICUC's regular 3-month course on 'Applied and Adaptive Research for Tropical Crop Production' will be held at the centre from October to December 1991. For further information please contact: ICUC, Atkins Building, King's College London, London W8 7AH.

An MSc course on 'Genome Manipulation in Plant Breeding' will be organised by the Centre from October 1991. Please contact for further information: ICUC, Atkins Building, King's College London, London W8 7AH.

## BOOK REVIEWS

Plant Domestication by Induced Mutation  
International Atomic Energy Agency,  
Vienna, 1989, pp. 199

These Proceedings are a very useful addition to the growing literature on underutilized crops. The publication contains 14 review papers presented at an Advisory Group Meeting on the possible Use

of Mutation Breeding for Rapid Domestication of New Crop Plants, held in

Vienna in November 1986, and a summary of the conclusions and recommendations reached.

General papers on genetic and cytogenetic aspects of plant domestication and the role of seed banks are followed by a

brief review of industrial requirements for new crops with special reference to meeting the vegetable and oil requirements of the European Community. There follow, studies on the domestication of specific groups of crops: the cereals, the vegetable *Brassica*, *Cuphea*, *Limnanthes* (meadowfoam), the *Phaseoleae*, and fruit trees.

Papers and recommendations are more broadly ranging than the title of the publication suggests. The potential for using induced mutants to facilitate domestication is explored, but as a promising tool and in the context that breeders should use the methodologies most appropriate to their material. The record of the final discussions provides a good summary of the spectrum of considerations and procedures involved in the identification, development and promotion of crops meriting high priority for future work.

With so much to be done to exploit the potential for new crop development, perhaps the most pressing need at present is to extend awareness of the likely benefits to those in industry and government able to allocate the resources to enable a more acceptable rate of progress to be achieved.

K.R.M. Anthony

Posey, D.A. and Balee, W. (Eds) (1989) *Resource Management in Amazonia: Indigenous and Folk Strategies*. New York Botanical Garden: *Advances in Economic Botany* Vol. 7. ISBN: 0-89327-340-6. pp. x + 287. US\$62.65 (paperback).

This publication contains contributions from the 'Resource management by indigenous and folk peoples of Amazonia' symposium at the 1985 Annual Meeting of the American Anthropological Association plus invited papers. The result is a series of learned essays by cultural anthropologists, ecologists and geographers.

The book is in two parts, 'Theoretical Approaches in Resource Management', preceded by a Foreword by Professor Ghillian T. Prance which provides an interesting and succinct review of the contents. Although an index is provided, botanical names in the tables as well as a number in the text were not included. I would also have preferred to see the authors of botanical names confined to the index instead of cluttering up the text - there was an inconsistency in the editing as to whether a paper contained or omitted authors' names.

As a non-Amazonian, my preconceived ideas on how a forest environment is utilized received a rude shock. The sophisticated manner in which the environment was actually managed by the tribal communities was amazing. Anderson and Posey, for example, describe how the *cerado* is managed by the Kayapo Indians, partly for fire, but more intriguingly by planting useful wild plants in specially prepared sites, with some of the species being brought from considerable distances. This study suggests that many apparently 'natural' tropical ecosystems have in fact been profoundly manipulated by man. Ecologists and plant geographers beware!

I found Alcorn's paper disturbing. His rather scathing references to the insensitivity of North America and Western European farmers to the environment suggested a rather biased determination to prove that the Amazonian Indians were unique. My own farming experience and doubtless that of many others would show that we too can relate farming operations to nature's seasonal behaviour and not to the computer.

This is a book to be read by all who are interested in Amazonia. Both developers and conservationists will learn much and be the better for so doing. A greater understanding of the social and ethnobiological importance of the environment should lead to better management in the future.

G.E. Wickens

## FRIENDS OF NEW CROPS

The ICUC has published a Newsletter and handled queries on underutilized crops by telephone and by letter for the last two years. Many of you have visited ICUC and encouraged us to pursue the Centre's activities. We are delighted that ICUC has been able to carry forward its activities, if only in the modest way permitted by its limited resources. Unfortunately, although information comes in continuously from the Centre's network, we have been unable to produce the Newsletter regularly owing to shortage of funds. We plan to expand our activities to meet your requirements and we can only do so if you can help us, as you did in establishing the Centre.

We desperately need funds to carry out the Centre's work and seek your help because of your concern for the development of new crops. Your contribution (corporate - £100 and individual - £25 per year) would enable the Centre to achieve its objectives, but a larger contribution would be much appreciated.

We look forward to your continued support to advance the objectives of the Centre.

FRIENDS OF NEW CROPS FRIENDS OF NEW CROPS  
FRIENDS OF NEW CROPS FRIENDS OF NEW CROPS  
FRIENDS OF NEW CROPS FRIENDS

The International Centre for Underutilized Crops is concerned with:-

- evaluating and promoting underutilized crops for both existing and new products
- selection of near market underutilized crop species
- research and development related to underutilized crops to maintain the environment
- disseminating information on underutilized crops and products
- training

We seek a contribution from you as a FRIEND OF NEW CROPS to achieve the above objectives.

## YOUR BENEFITS

1. Free newsletter (4 issues per year)
2. Free membership of the International Network of CUC
3. Free Annual Reports of CUC
4. Free leaflets on the cultivation methods for underutilized crops
5. Professional counselling (Members expected to meet costs)
6. Priority access to CUC's information system at reduced rate (depending on the type of information)
7. ICUC publications at reduced rate
8. Help to obtain photocopies of papers on underutilized crops (Members expected to meet costs)

PLEASE RETURN THIS FORM WITH YOUR PAYMENT (Please use block capitals)

Cheques should be made payable to:  
INTERNATIONAL CENTRE FOR UNDERUTILIZED CROPS

TITLE:

SURNAME OR COMPANY:

FIRST NAMES:

ADDRESS:

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CONTRIBUTION ENCLOSED:

METHOD OF PAYMENT:

\* Overseas contributors - please make payment in £ sterling to avoid bank charges



## **INTERNATIONAL CENTRE FOR UNDERUTILISED CROPS**

Promoting Plant species for Food, Industry, Energy & Sustainable Environment

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Annex office 824857/ 815431  
Ramna 5  
P.O. Box 1048  
Islamabad  
Pakistan

29.4.91

### **Re.: Alternative Crops for Drug- growing areas in Pakistan and Afghanistan**

Dear Ms Eighemy,

Your address was pointed out to me by Mr Denziel Phillips of High Value Crops PLC, Agricultural Consultants as a possible source of information on the illegal drug industry in Pakistan and Afghanistan.

The International Centre for Underutilized Crops (ICUC), aims to promote the use of high value alternative crops in the poorer areas of the world. One of the new ICUC programmes is a 4 month ODA- funded study of possible alternative crops for the drug- growing areas of Afghanistan, Pakistan, Nepal and Thailand. The aims of the programme are

(a) to collate the existing information of the various previous international programmes (e.g. FAO, UNIDCP, NRI) in order to arrive at an approach strategy for future initiatives, and  
(b) to make a through survey of high value commodity groups and crop species that could be used as alternatives. The methods of identification will be based on analyzing agro- ecological systems and assessing the potential market value of plant products and outlets. The project will concentrate on the poorest, and most marginal agricultural areas on the higher slopes of the mountainous areas (i.e. dry soils low in organic matter, low winter temperatures and large diurnal temperature variation).

The output of the project will be a detailed report which will help planners to select alternative crop development programmes. The ultimate beneficiaries will be the farmers and rural communities of the drug- growing areas.

We would be very grateful if you could provide or point out information on the following:

. suggest which areas in Afghanistan and Pakistan should be

singled out for our attention (either on the basis of the extent of opium and marijuana growing, or on the basis of the poverty of the area).

. large scale local maps of the drug growing areas.  
information on agro- climatic data.  
local or international markets for the crops that are produced.  
(I have found that this information is the most difficult to locate).

. suggest possible commodity groups and specific high- value alternative crops we should concentrate on. What do you think about the possibility of aiming to establish a legal opium poppy growing industry in these areas?

. contact addresses or titles of reports you have of the programmes aimed at finding alternative crops for drug- growing areas particularly NW Frontier Province and NE Afghanistan.

We would be very grateful for a speedy reply, as the report for this project has to be submitted by July.

If we can provide any information to your organization please do not hesitate to request it.  
Looking forward to your reply,

Yours sincerely,



Nicole Potulski  
Agro- Ecology Programme